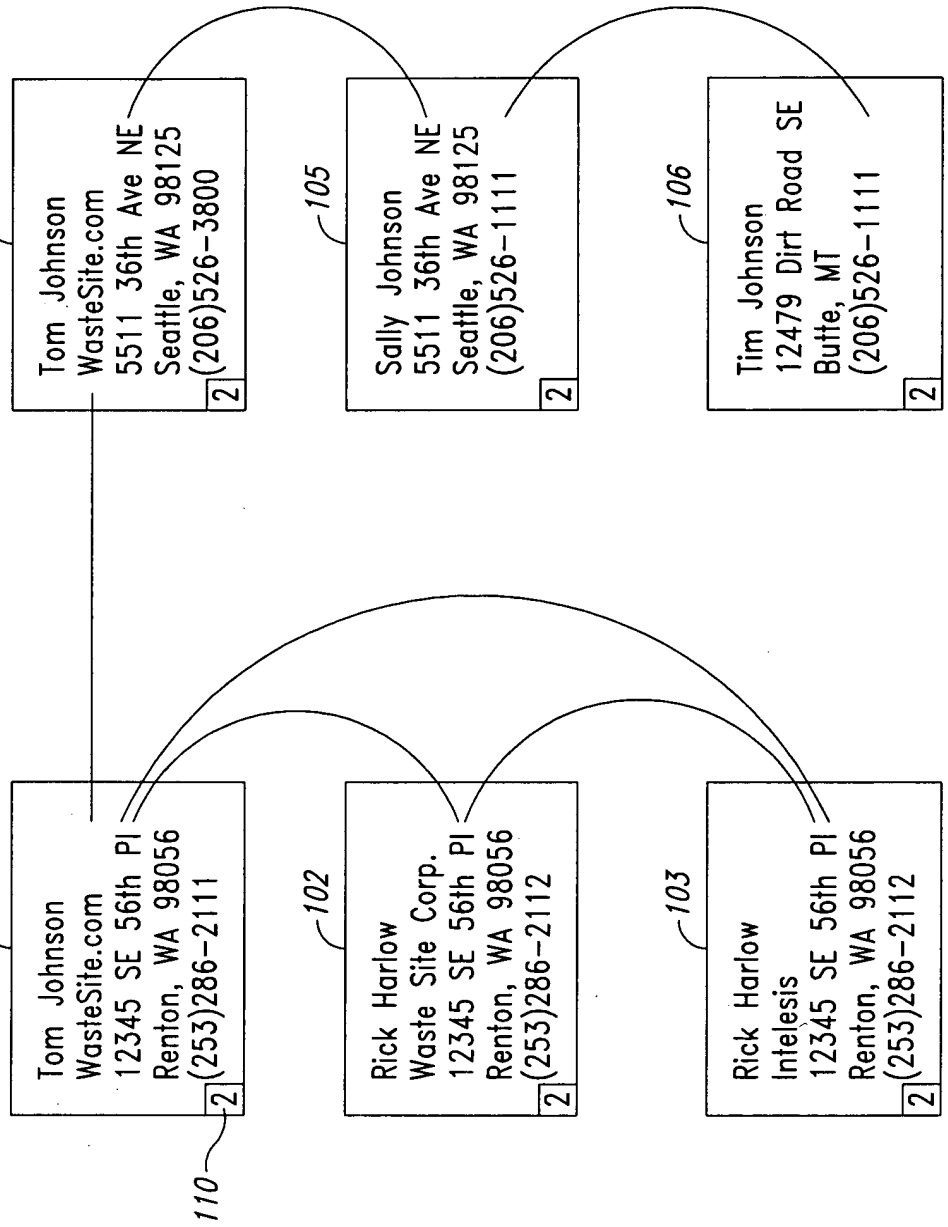
101
Tom Johnson
WasteSite.com
12345 SE 56th Pl
Renton, WA 98056
(253)286-2111
2
102
Rick Harlow
Waste Site Corp.
12345 SE 56th Pl
Renton, WA 98056
(253)286-2112
2
103
Rick Harlow
Intelesis
12345 SE 56th Pl
Renton, WA 98056
(253)286-2112
2
104
Tom Johnson
WasteSite.com
5511 36th Ave NE
Seattle, WA 98125
(206)526-3800
2
105
Sally Johnson
5511 36th Ave NE
Seattle, WA 98125
(206)526-1111
2
106
Tim Johnson
12479 Dirt Road SE
Butte, MT
(206)526-1111
2
110

Fig. 1

Attached to and forming part of

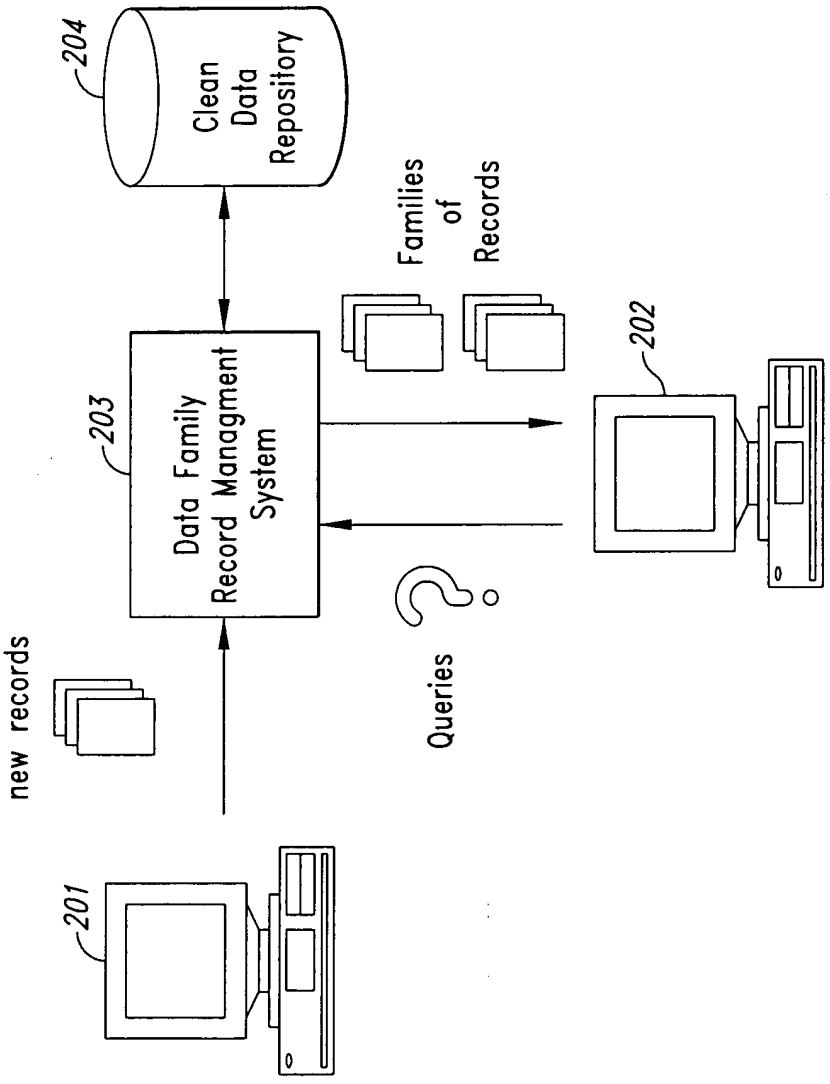

Fig. 2

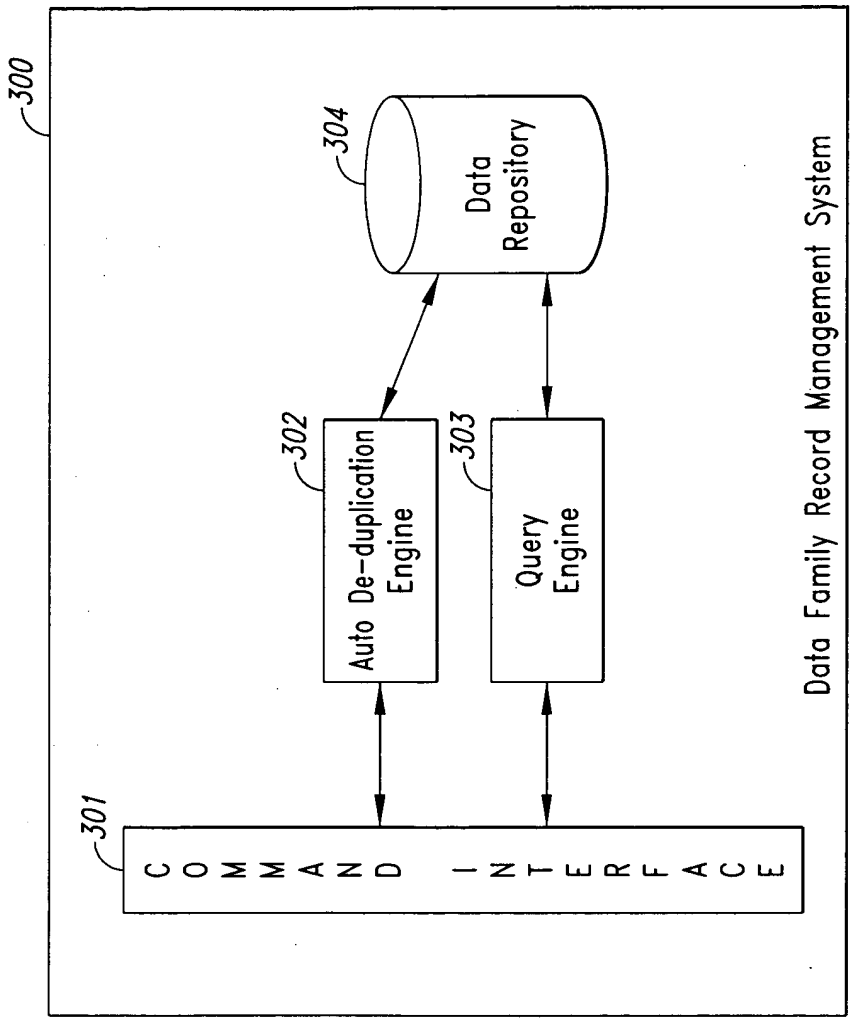
300
Data Family Record Management System
304
Data Repository
302
Auto De-duplication Engine
303
Query Engine
301
COMMAND INTERFACE

Fig. 3

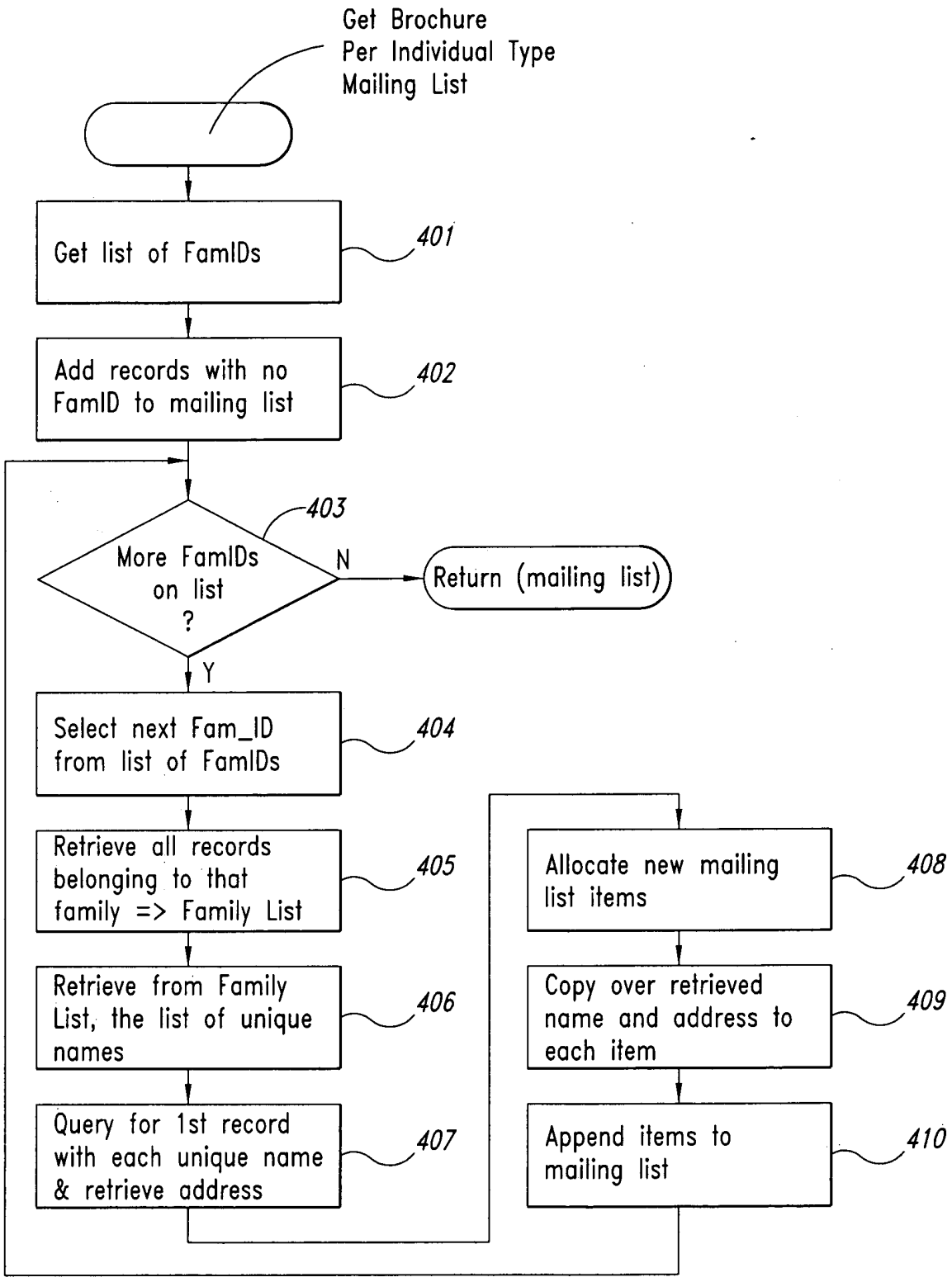
Get Brochure Per Individual Type Mailing List
Get list of FamIDs
401
Add records with no FamID to mailing list
402
More FamIDs on list ?
403
N
Return (mailing list)
Y
Select next Fam_ID from list of FamIDs
404
Retrieve all records belonging to that family => Family List
405
Retrieve from Family List, the list of unique names
406
Query for 1st record with each unique name & retrieve address
407
Allocate new mailing list items
408
Copy over retrieved name and address to each item
409
Append items to mailing list
410

Fig. 4

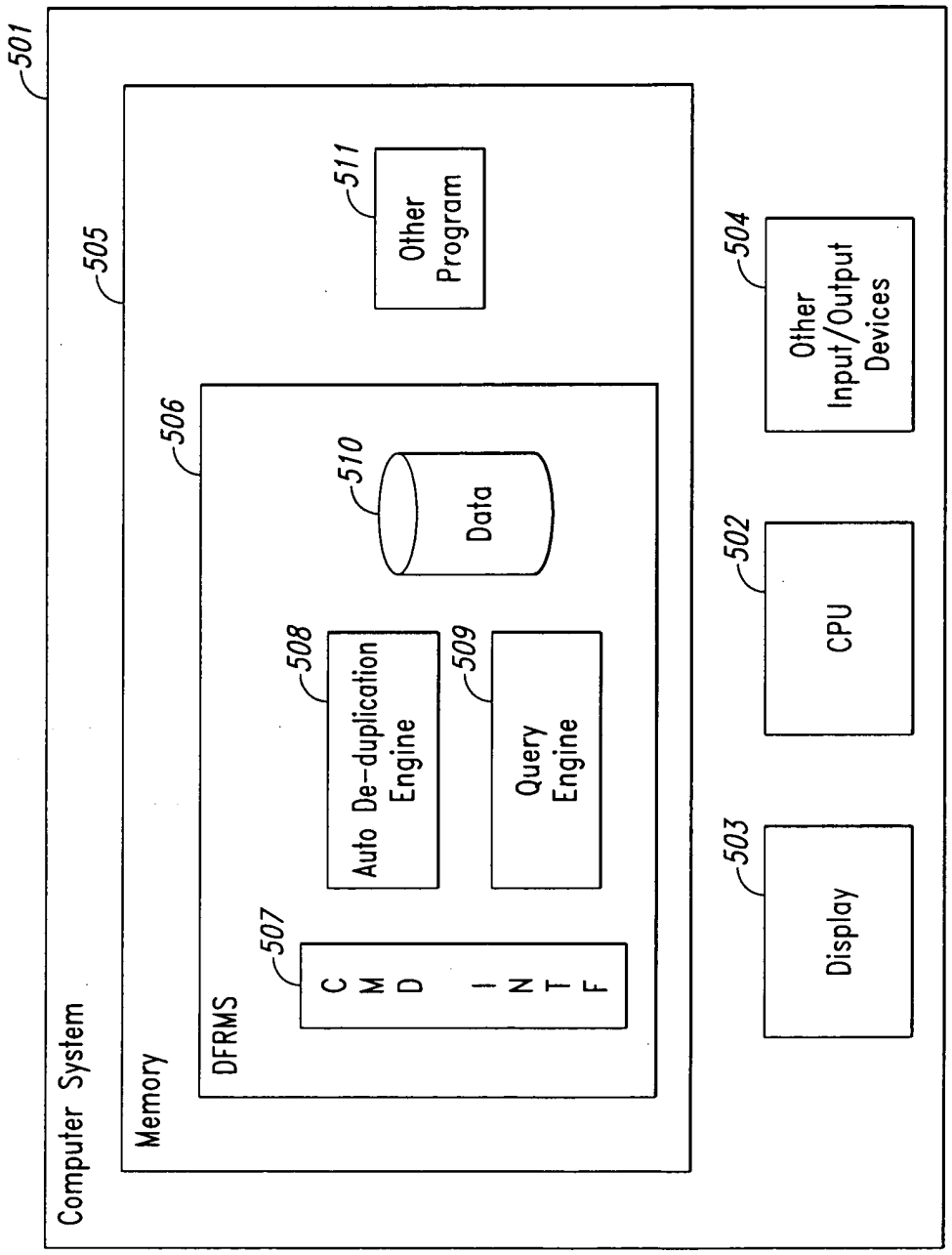
501
Computer System
505
Memory
506
DFRMS
507
C M D I N T F
508
Auto De-duplication Engine
509
Query Engine
510
Data
511
Other Program
502
CPU
503
Display
504
Other Input/Output Devices

Fig. 5

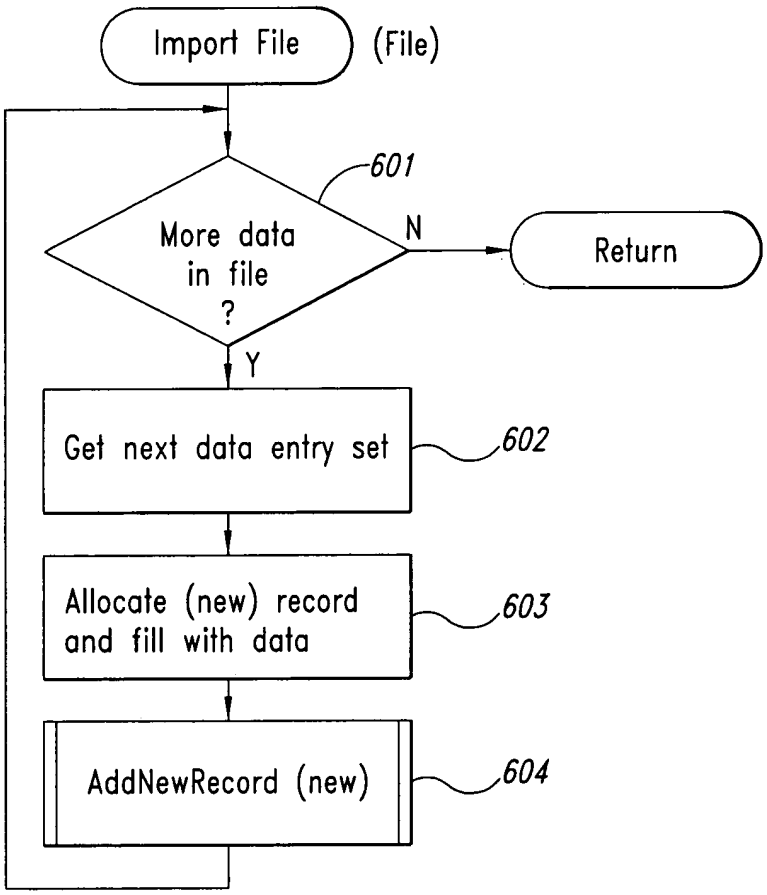
Import File
(File)
601
More data in file ?
N
Return
Y
Get next data entry set
602
Allocate (new) record and fill with data
603
AddNewRecord (new)
604

Fig. 6

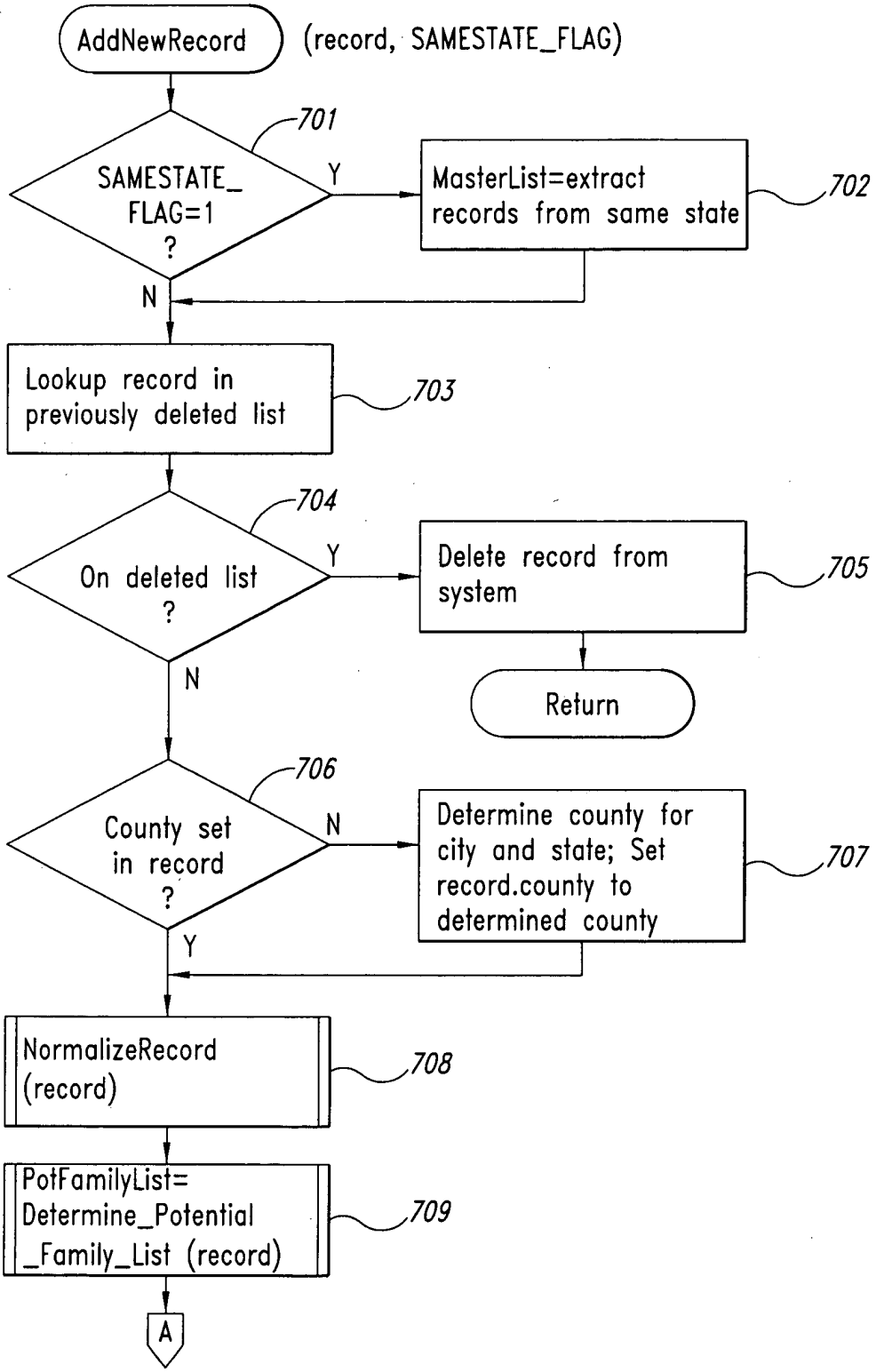
AddNewRecord
(record, SAMESTATE_FLAG)
701
SAMESTATE_ FLAG=1 ?
Y
MasterList=extract records from same state
702
N
Lookup record in previously deleted list
703
704
On deleted list ?
Y
Delete record from system
705
Return
N
706
County set in record ?
N
Determine county for city and state; Set record.county to determined county
707
Y
NormalizeRecord (record)
708
PotFamilyList= Determine_Potential _Family_List (record)
709
A

Fig. 7A

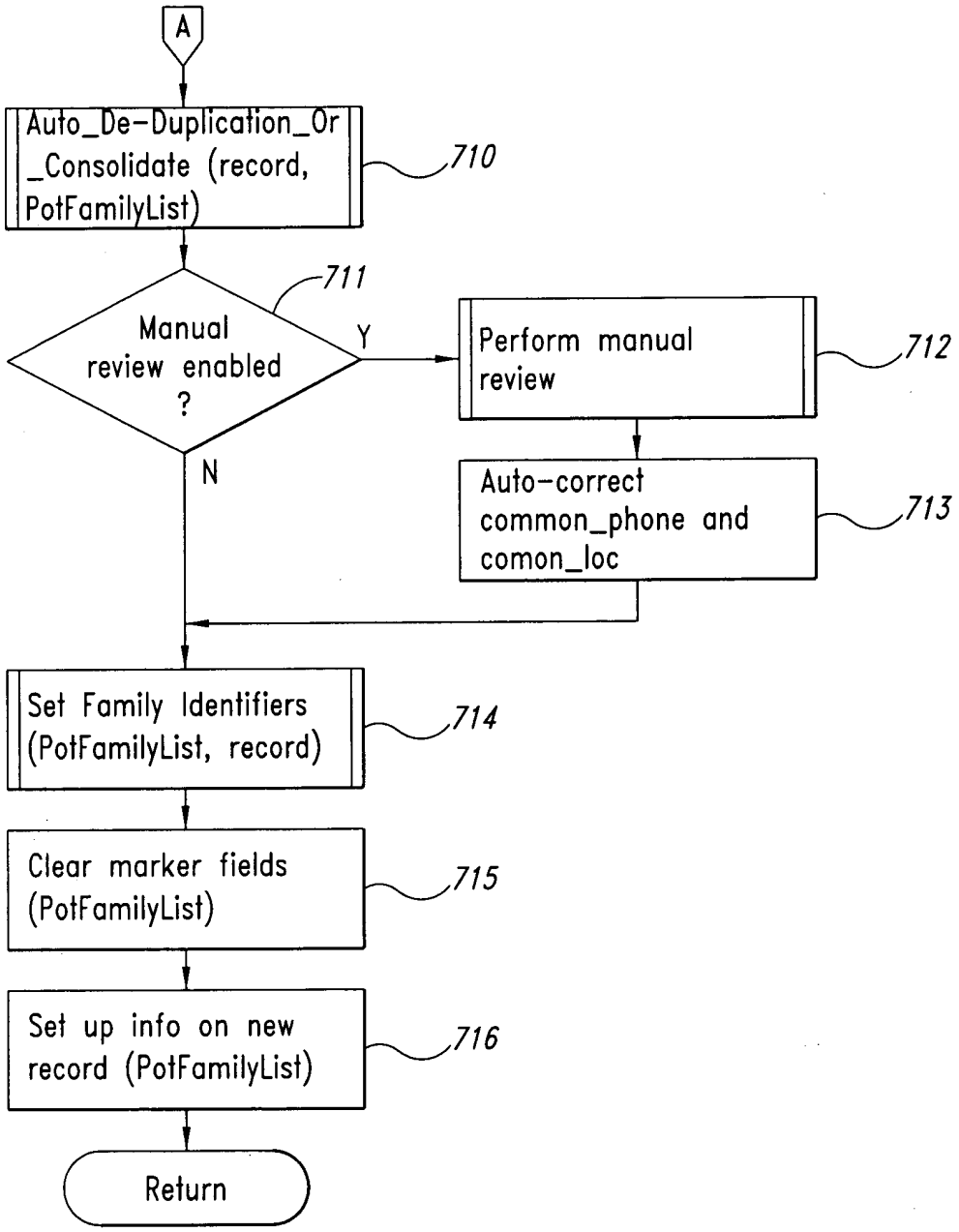
A
Auto_De-Duplication_Or_Consolidate (record, PotFamilyList)
710
Manual review enabled ?
711
Y
N
Perform manual review
712
Auto-correct common_phone and comon_loc
713
Set Family Identifiers (PotFamilyList, record)
714
Clear marker fields (PotFamilyList)
715
Set up info on new record (PotFamilyList)
716
Return

Fig. 7B

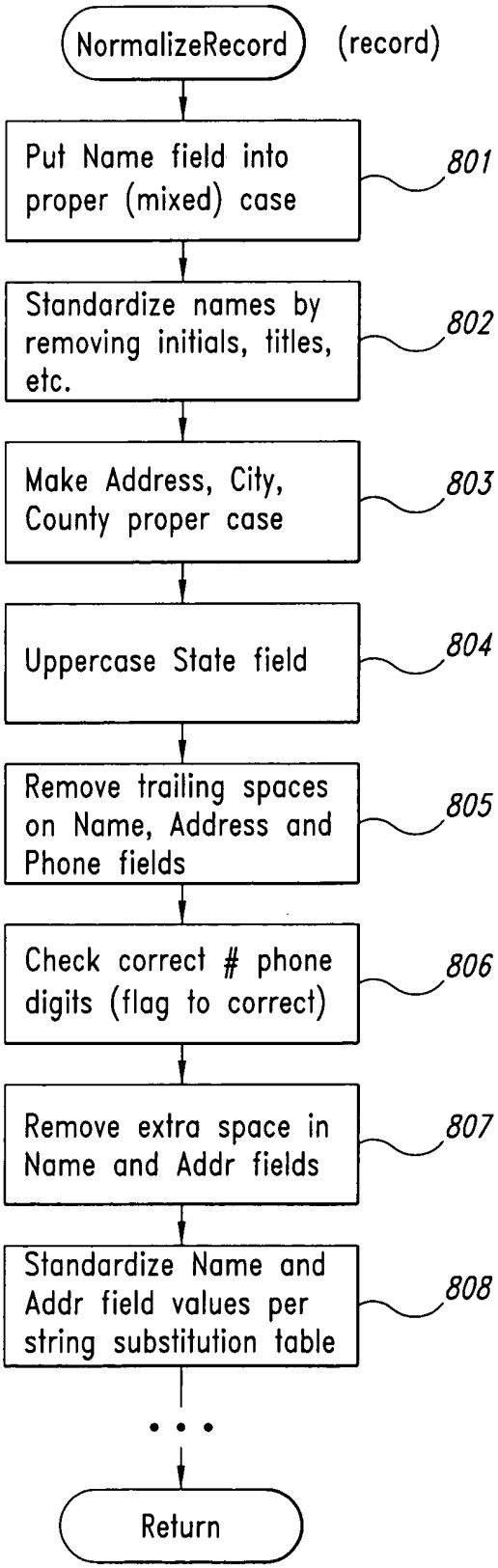
NormalizeRecord
(record)
Put Name field into proper (mixed) case
801
Standardize names by removing initials, titles, etc.
802
Make Address, City, County proper case
803
Uppercase State field
804
Remove trailing spaces on Name, Address and Phone fields
805
Check correct # phone digits (flag to correct)
806
Remove extra space in Name and Addr fields
807
Standardize Name and Addr field values per string substitution table
808
• • •
Return

Fig. 8

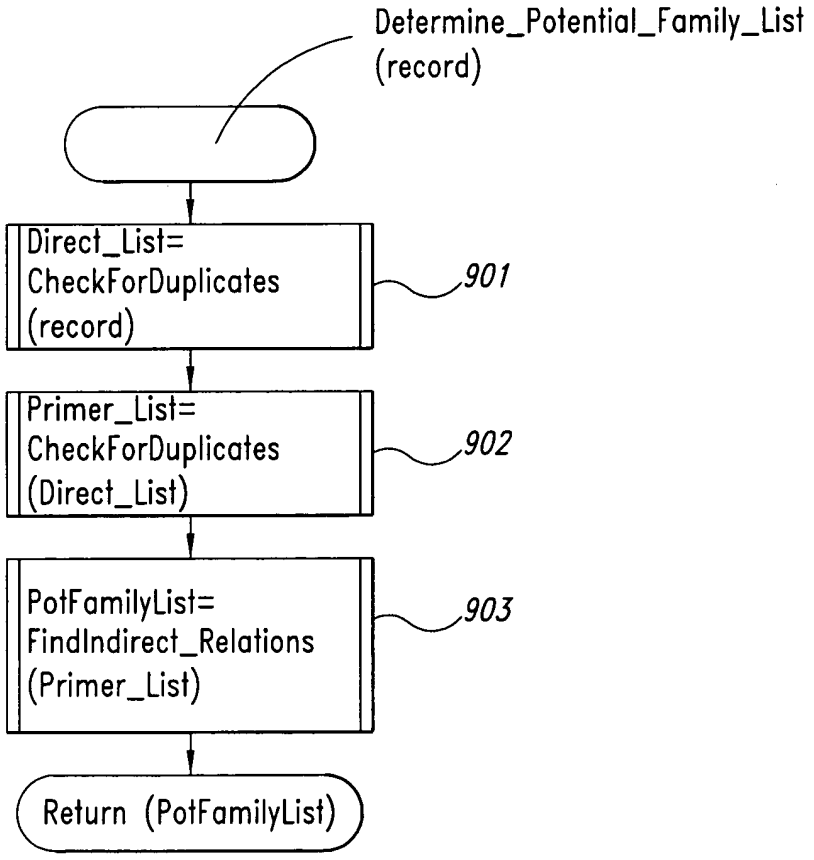
Determine_Potential_Family_List
(record)
Direct_List=
CheckForDuplicates
(record)
901
Primer_List=
CheckForDuplicates
(Direct_List)
902
PotFamilyList=
FindIndirect_Relations
(Primer_List)
903
Return (PotFamilyList)

Fig. 9

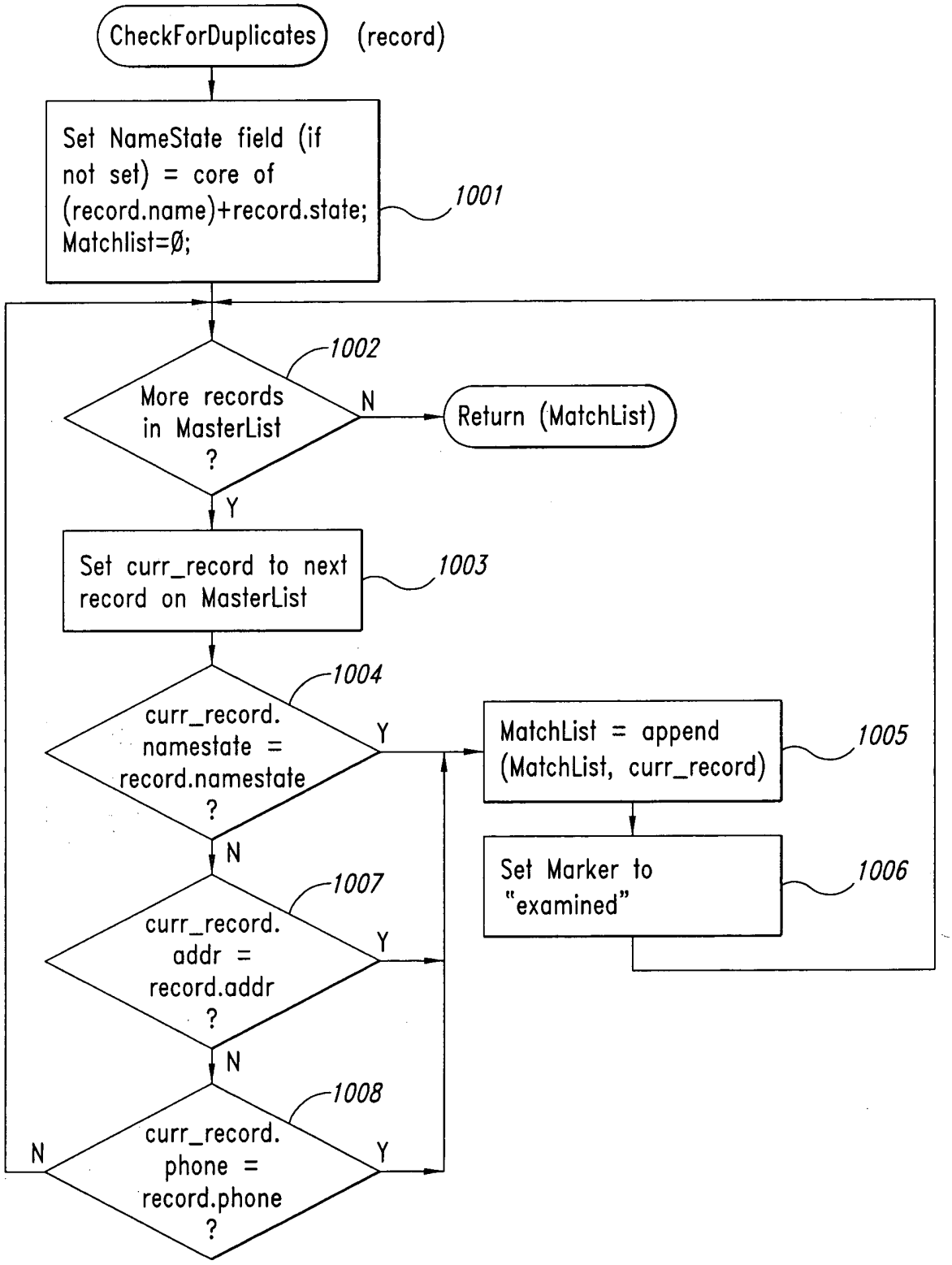
CheckForDuplicates (record)
Set NameState field (if not set) = core of (record.name)+record.state; Matchlist=Ø;
1001
1002
More records in MasterList ?
N
Return (MatchList)
Y
Set curr_record to next record on MasterList
1003
1004
curr_record. namestate = record.namestate ?
Y
MatchList = append (MatchList, curr_record)
1005
Set Marker to "examined"
1006
N
1007
curr_record. addr = record.addr ?
Y
N
1008
curr_record. phone = record.phone ?
Y
N

Fig. 10

Table 1: Results After Direct Check of New Record
Summary: Record 9 located Record 1 (by Phone), Records 7 and 8 (by Address) and Record 4 by NameState

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match
1	Fuel Processors, WA	701 First Avenue	367-3319			51	Phone
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51	
3	Fuel Processors, WA	222 15th Avenue NE	555-1212	2	9	51	
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51	NameState
5	John's Oil-Refining, WA	222 15th Avenue	555-1212	2	9	51	
6	John's Oil-Refining, WA	1600 Oak Tree Road	614-9200			51	
7	John's Oil Pickup, WA	11750 33rd Place	417-6000		33	7	Address
8	John's Service, WA	11750 33rd Place	417-3251		33	7	Address
9	Oil Re-Refining, WA	11750 33rd Place	367-3319				NEW RECORD

1101

Table 2: Potential Family List (Found Set) After Direct Check
(Sorted by NameState)

1102

#	NameState	Phone	Common Phone	Common Location	Family	Source of Match	Potential Family	Record to Check	Found Order
1	Fuel Processors, WA	367-3319			51	Phone	Yes	1	1
7	John's Oil Pickup, WA	417-6000		33	7	Address	Yes	1	2
8	John's Service, WA	417-3251		33	7	Address	Yes	1	3
4	Oil Re-Refining, WA	526-6149	1		51	NameState	Yes	1	4
9	Oil Re-Refining, WA	367-3319				NEW RECORD	Yes	1	5

Fig. 11

Table 3: Results After Direct Check of Records in Table 2

Results After Loop 1

Summary: Record 1 located Record 9 (by Phone), Record 2 (by NameState) and Record 3 (by NameState), marks them as Potential Family members, and adds them to the end of the list.

1201

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	Potential Family	Record to Check	Found Order
1	Fuel Processors, WA	701 First Avenue	367-3319			51	Record to Check	Yes	1	1
7	John's Oil Pickup, WA	11750 33rd Place	417-6000		33	7		Yes	1	2
8	John's Service, WA	11750 33rd Place	417-3251		33	7		Yes	1	3
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51		Yes	1	4
9	Oil Re-Refining, WA	11750 33rd Place	367-3319				Phone	Yes	1	5
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51	NameState	Yes	1	6
3	Fuel Processors, WA	222 15th Avenue	555-1212	2	9	51	NameState	Yes	1	7

Subsequent Results:

Summary Loop 2: Record 7 located Record 8 (by Address) and Record 9 (by Address), both previously found. Seeing that a Common Location ID has been already been assigned to this record (indicating there are already at least two records with this Address), the Common Location number is copied over to other records with the same Address that have an empty Common Location field, e.g. Record 9.

Summary Loop 3: Record 8 located Record 7 (by Address) and Record 9 (by Address), both previously found.

Summary Loop 4: Record 4 located Record 2 (by Phone) and Record 9 (by NameState), both previously found.

Summary Loop 5: Record 9 located Record 1 (by Phone), Record 7 (by Address) and Record 9 (by Address), all previously found.

Fig. 12

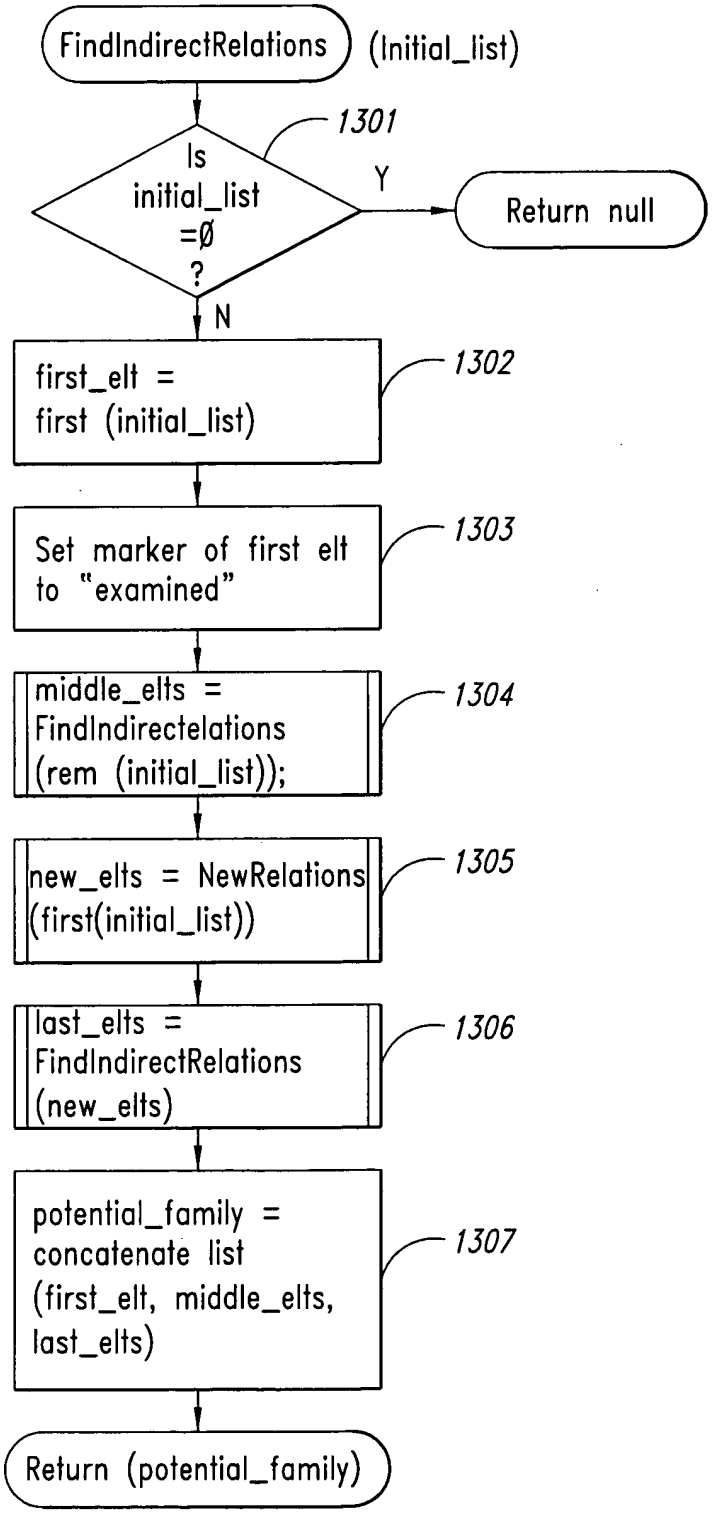
FindIndirectRelations (Initial_list)
1301
Is initial_list =Ø ?
Y
Return null
N
first_elt = first (initial_list)
1302
Set marker of first elt to "examined"
1303
middle_elts = FindIndirectelations (rem (initial_list));
1304
new_elts = NewRelations (first(initial_list))
1305
last_elts = FindIndirectRelations (new_elts)
1306
potential_family = concatenate list (first_elt, middle_elts, last_elts)
1307
Return (potential_family)

Fig. 13

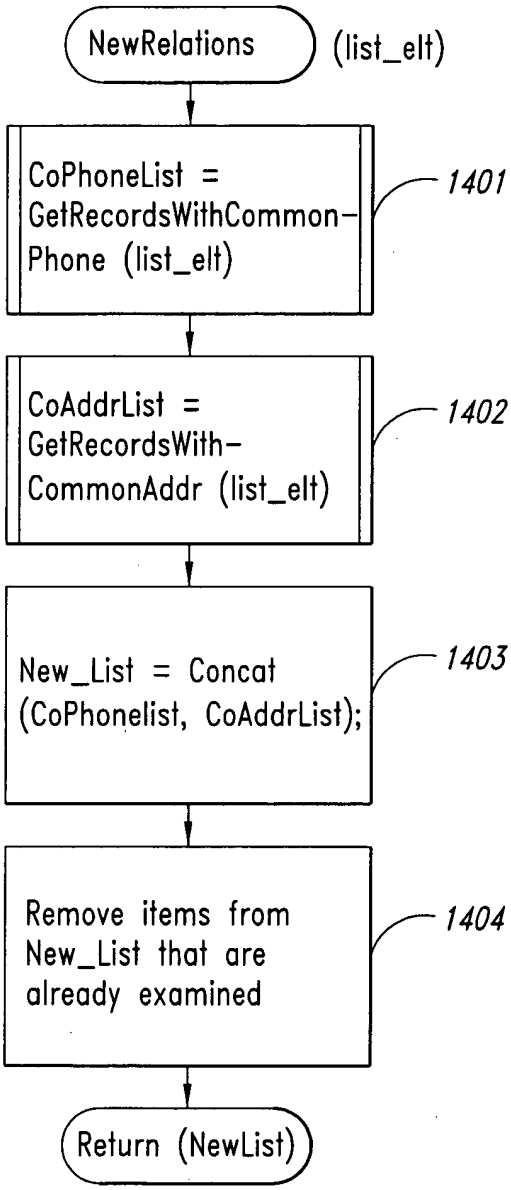
NewRelations
(list_elt)
CoPhoneList = GetRecordsWithCommon-Phone (list_elt)
1401
CoAddrList = GetRecordsWith-CommonAddr (list_elt)
1402
New_List = Concat (CoPhonelist, CoAddrList);
1403
Remove items from New_List that are already examined
1404
Return (NewList)

Fig. 14

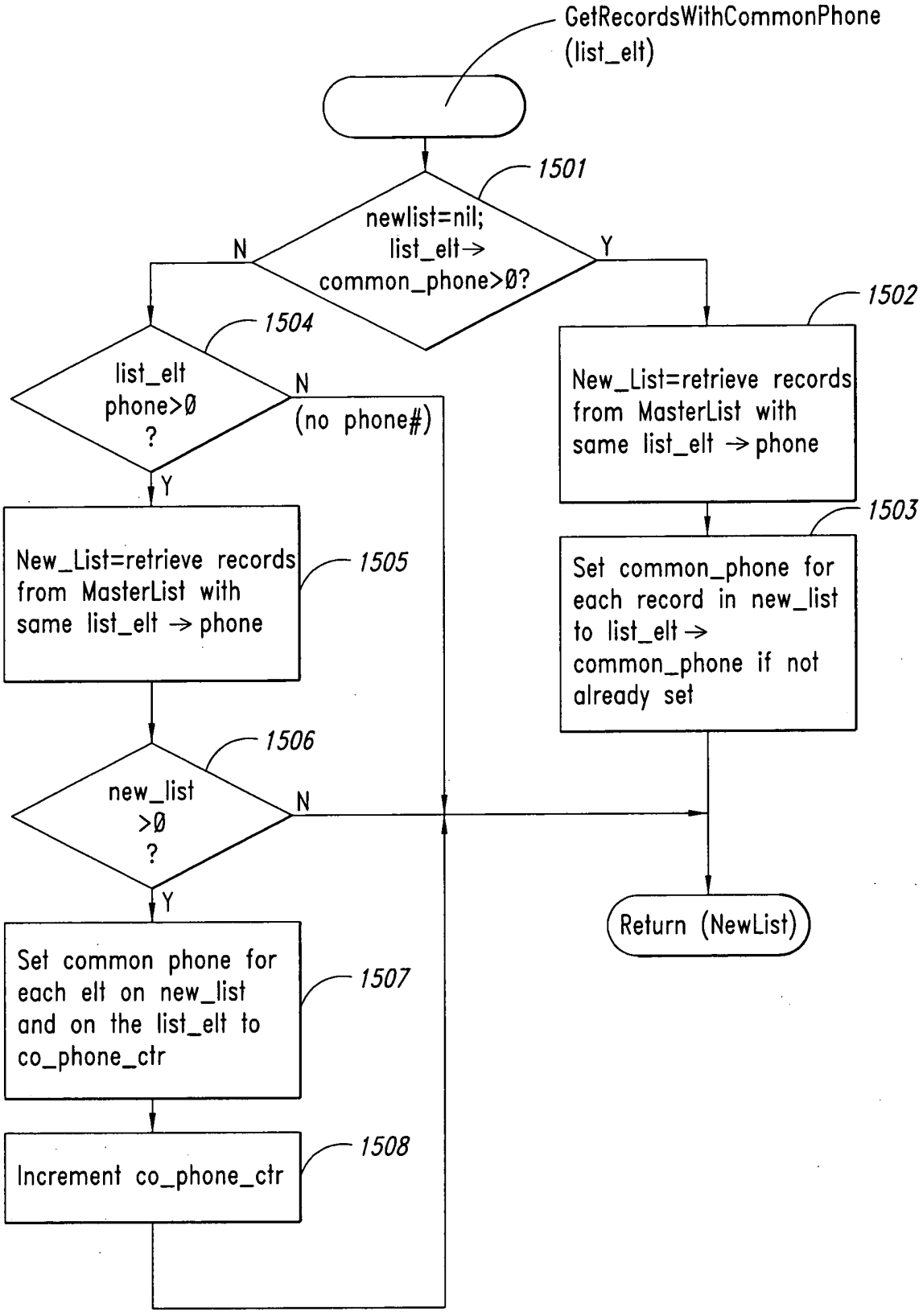
GetRecordsWithCommonPhone
(list_elt)
1501
newlist=nil;
list_elt->
common_phone>Ø?
N
Y
1502
New_List=retrieve records
from MasterList with
same list_elt -> phone
1503
Set common_phone for
each record in new_list
to list_elt ->
common_phone if not
already set
1504
list_elt
phone>Ø
?
N
(no phone#)
Y
1505
New_List=retrieve records
from MasterList with
same list_elt -> phone
1506
new_list
>Ø
?
N
Y
1507
Set common phone for
each elt on new_list
and on the list_elt to
co_phone_ctr
1508
Increment co_phone_ctr
Return (NewList)

Fig. 15

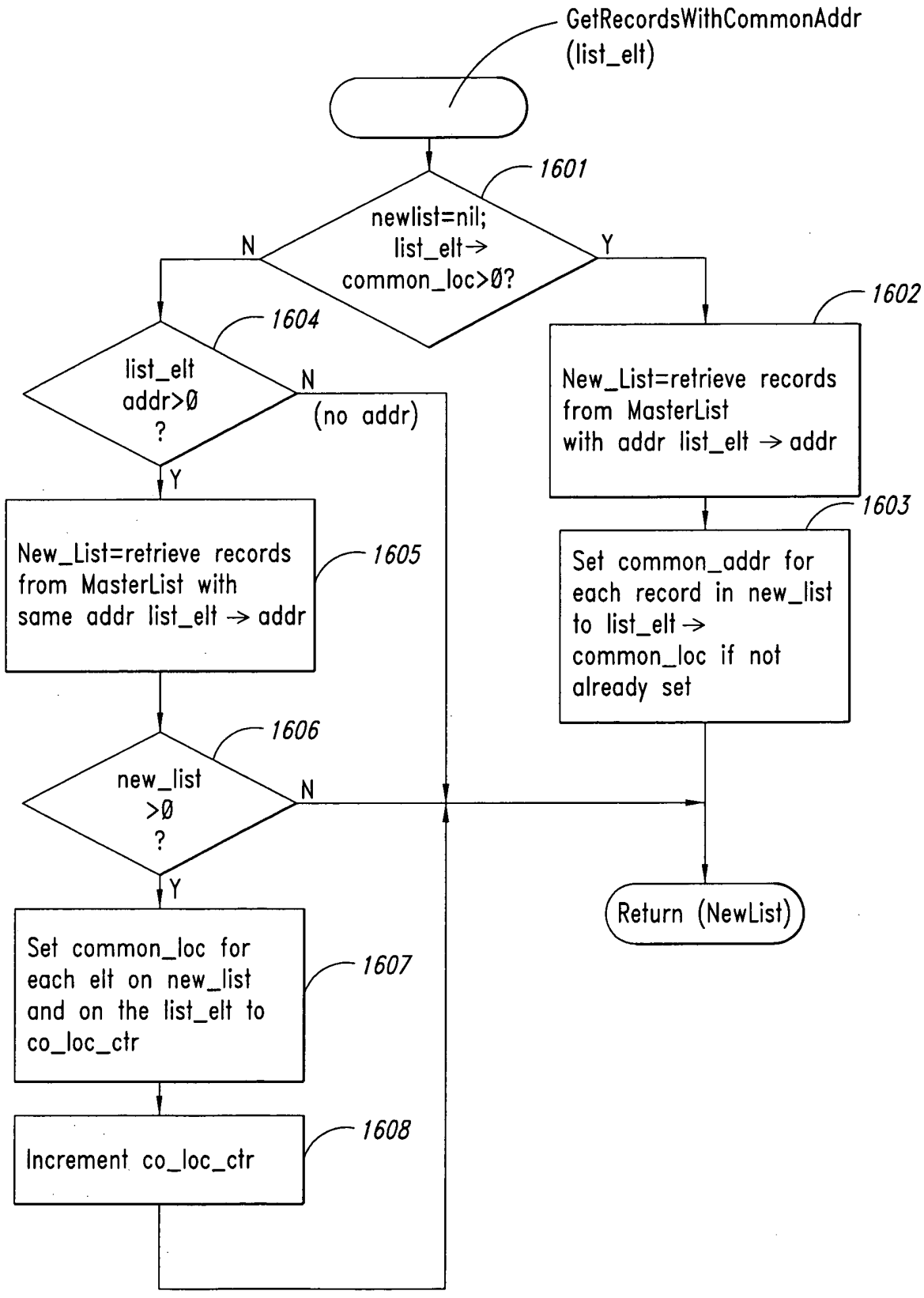
GetRecordsWithCommonAddr
(list_elt)
1601
newlist=nil;
list_elt→
common_loc>Ø?
N
Y
1602
New_List=retrieve records
from MasterList
with addr list_elt → addr
1603
Set common_addr for
each record in new_list
to list_elt →
common_loc if not
already set
1604
list_elt
addr>Ø
?
N
(no addr)
Y
1605
New_List=retrieve records
from MasterList with
same addr list_elt → addr
1606
new_list
>Ø
?
N
Y
1607
Set common_loc for
each elt on new_list
and on the list_elt to
co_loc_ctr
1608
Increment co_loc_ctr
Return (NewList)

Fig. 16

Results After Indirect Search

Table 4: Results After Loop 1
Summary: Record 1 located Record 9 (by Phone), previously found.

1701

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	Potential Family	Record to Check	Found Order
1	Fuel Processors, WA	701 First Avenue	367-3319			51	Record to Check	Yes	1	1
7	John's Oil Pickup, WA	11750 33rd Place	417-6000		33	7		Yes	1	2
8	John's Service, WA	11750 33rd Place	417-3251		33	7		Yes	1	3
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51		Yes	1	4
9	Oil Re-Refining, WA	11750 33rd Place	367-3319				Phone	Yes	1	5
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51		Yes	1	6
3	Fuel Processors, WA	222 15th Avenue	555-1212	2	9	51		Yes	1	7

Table 5: Subsequent Results
Note: Refer to Table 1 above for a complete list.
Summary Loop 2: Record 7 located Record 8 (by Address) and Record 9 (by Address), both previously found. Seeing that a Common Location ID has been assigned to this record, the Common Location number is copied over to other records with the same Address that have an empty Common Location field, e.g. Record 9.
Summary Loop 3: Record 8 located Record 7 (by Address) and Record 9 (by Address), both previously found.
Summary Loop 4: Record 4 located Record 2 (by Phone), previously found.
Summary Loop 5: Record 9 located Record 1 (by Phone), Record 7 (by Address) and Record 9 (by Address), all previously found.
Summary Loop 6: Record 2 located Record 4 (by Phone), previously found.
Summary Loop 7: Record 3 located Record 5 (by Phone and Address), a new record and adds it to the bottom of the list.

1702

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	Potential Family	Record to Check	Found Order
1	Fuel Processors, WA	701 First Avenue	367-3319			51		Yes	7	1
7	John's Oil Pickup, WA	11750 33rd Place	417-6000		33	7		Yes	7	2
8	John's Service, WA	11750 33rd Place	417-3251		33	7		Yes	7	3
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51		Yes	7	4
9	Oil Re-Refining, WA	11750 33rd Place	367-3319		33			Yes	7	5
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51		Yes	7	6
3	Fuel Processors, WA	222 15th Avenue	555-1212	2	9	51	Record to Check	Yes	7	7
5	John's Oil-Refining, WA	222 15th Avenue	555-1212	2	9	51	Phone and Address	Yes	7	8

Fig. 17

Table 6: Complete Results After Loop 8 of Indirect Search
Summary: Record 5 located Record 3 (by Phone), previously found, and the loop ends.

1801

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	Potential Family	Record to Check	Found Order
1	Fuel Processors, WA	701 First Avenue	367-3319			51		Yes	8	1
7	John's Oil Pickup, WA	11750 33rd Place	417-6000		33	7		Yes	8	2
8	John's Service, WA	11750 33rd Place	417-3251		33	7		Yes	8	3
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51		Yes	8	4
9	Oil Re-Refining, WA	11750 33rd Place	367-3319		33			Yes	8	5
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51		Yes	8	6
3	Fuel Processors, WA	222 15th Avenue	555-1212	2	9	51	Phone	Yes	8	7
5	John's Oil-Refining, WA	222 15th Avenue	555-1212	2	9	51	Record to Check	Yes	8	8

Fig. 18

Table 7: Alternative: Using NameState in the Embedded Search

Note: NameState is not included in the Embedded Search loop as shown herein, although it can be. In this case, in the event that a Record 6 exists that matches Record 5 only off of the NameState, Record 6 would not have been located by the Embedded Search on Record 5. The reasoning behind excluding the NameState in the Embedded Search is due to the extended relationship of Record 6 to the original set of records being searched on. It is, at this point, fairly removed and the Family ID loses some meaning. While this is not a common occurence, a final loop searching off of the Families present in the final set of found records can find any remaining missing family members, thus picking up Record 6 if desired. Alternatively, the NameState can be included in the Embedded Search.

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	Potential Family	Record to Check	Found Order
1	Fuel Processors, WA	701 First Avenue	367-3319			51		Yes	9	1
7	John's Oil Pickup, WA	11750 33rd Place	417-6000		33	7		Yes	9	2
8	John's Service, WA	11750 33rd Place	417-3251		33	7		Yes	9	3
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51		Yes	9	4
9	Oil Re-Refining, WA	11750 33rd Place	367-3319		33			Yes	9	5
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51		Yes	9	6
3	Fuel Processors, WA	222 15th Avenue	555-1212	2	9	51		Yes	9	7
5	John's Oil-Refining, WA	222 15th Avenue	555-1212	2	9	51	Record to Check	Yes	9	8
6	John's Oil-Refining, WA	1600 Oak Tree Road	614-9200			51		Yes	9	9

Fig. 19

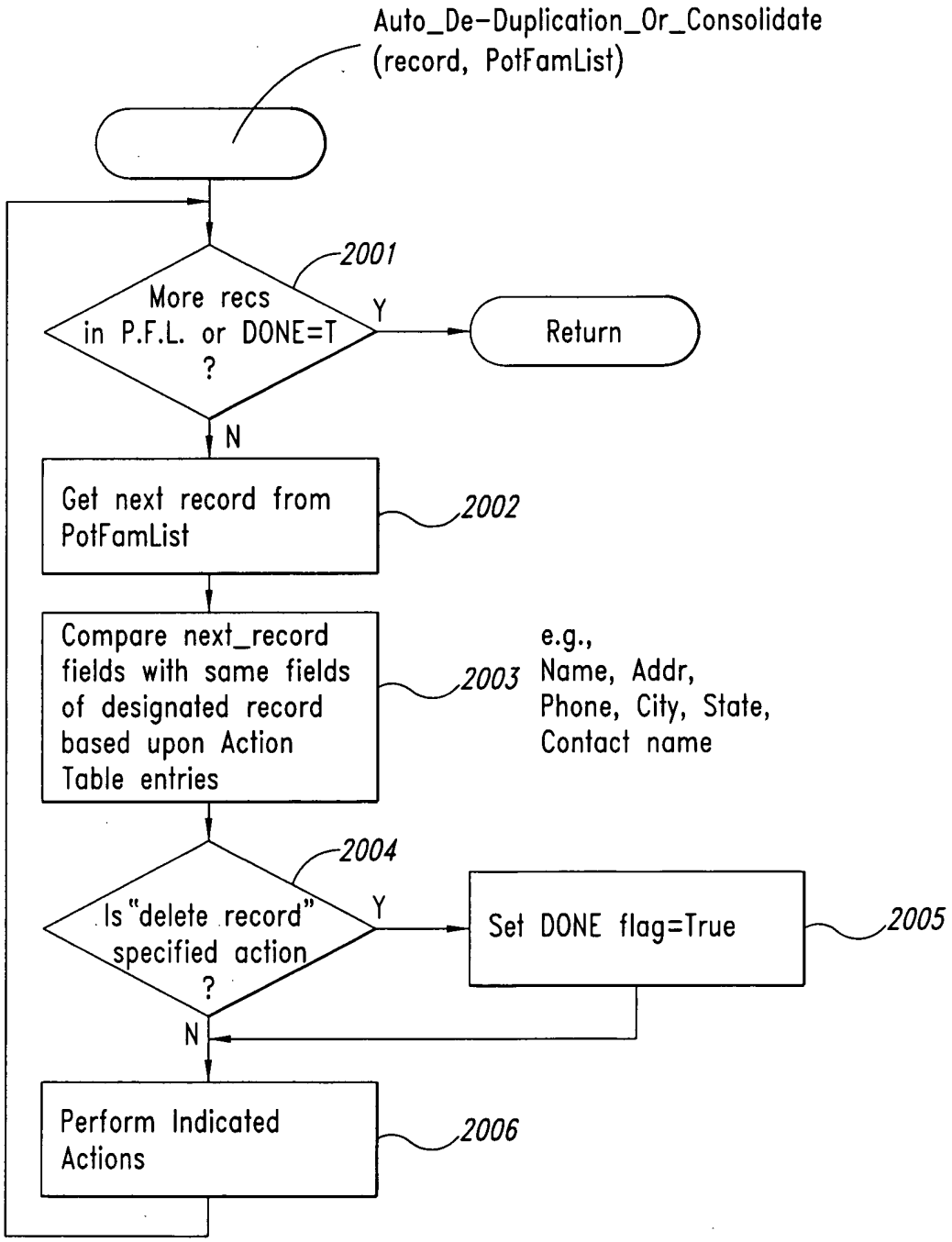
Auto_De-Duplication_Or_Consolidate
(record, PotFamList)
2001
More recs in P.F.L. or DONE=T ?
Y
Return
N
Get next record from PotFamList
2002
Compare next_record fields with same fields of designated record based upon Action Table entries
2003
e.g., Name, Addr, Phone, City, State, Contact name
2004
Is "delete record" specified action ?
Y
Set DONE flag=True
2005
N
Perform Indicated Actions
2006

Fig. 20

Title: METHOD AND SYSTEM FOR IDENTIFICATION AND MAINTENANCE OF FAMILIES OF DATA RECORDS
Inventor(s): Kel[redacted]inig Express Mail No. EV064993065US [redacted]et No. 480142.401

Automatic De-Duplication

Table 8: Results After Dedup
Summary: Common Phone IDs are assigned to Records 1 and 9.

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	Potential Family	Record to Check	Found Order
1	Fuel Processors, WA	701 First Avenue	367-3319	3		51		Yes	9	1
7	John's Furnace Repair, WA	11750 33rd Place	417-6000		33	7		Yes	9	2
8	John's Service, WA	11750 33rd Place	417-3251		33	7		Yes	9	3
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51		Yes	9	4
9	Oil Re-Refining, WA	11750 33rd Place	367-3319	3	33			Yes	9	5
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51		Yes	9	6
3	Fuel Processors, WA	222 15th Avenue	555-1212	2	9	51		Yes	9	7
5	John's Oil-Refining, WA	222 15th Avenue	555-1212	2	9	51	NameState	Yes	9	8
6	John's Oil-Refining, WA	1600 Oak Tree Road	614-9200			51	Record to Check	Yes	9	9

Fig. 21

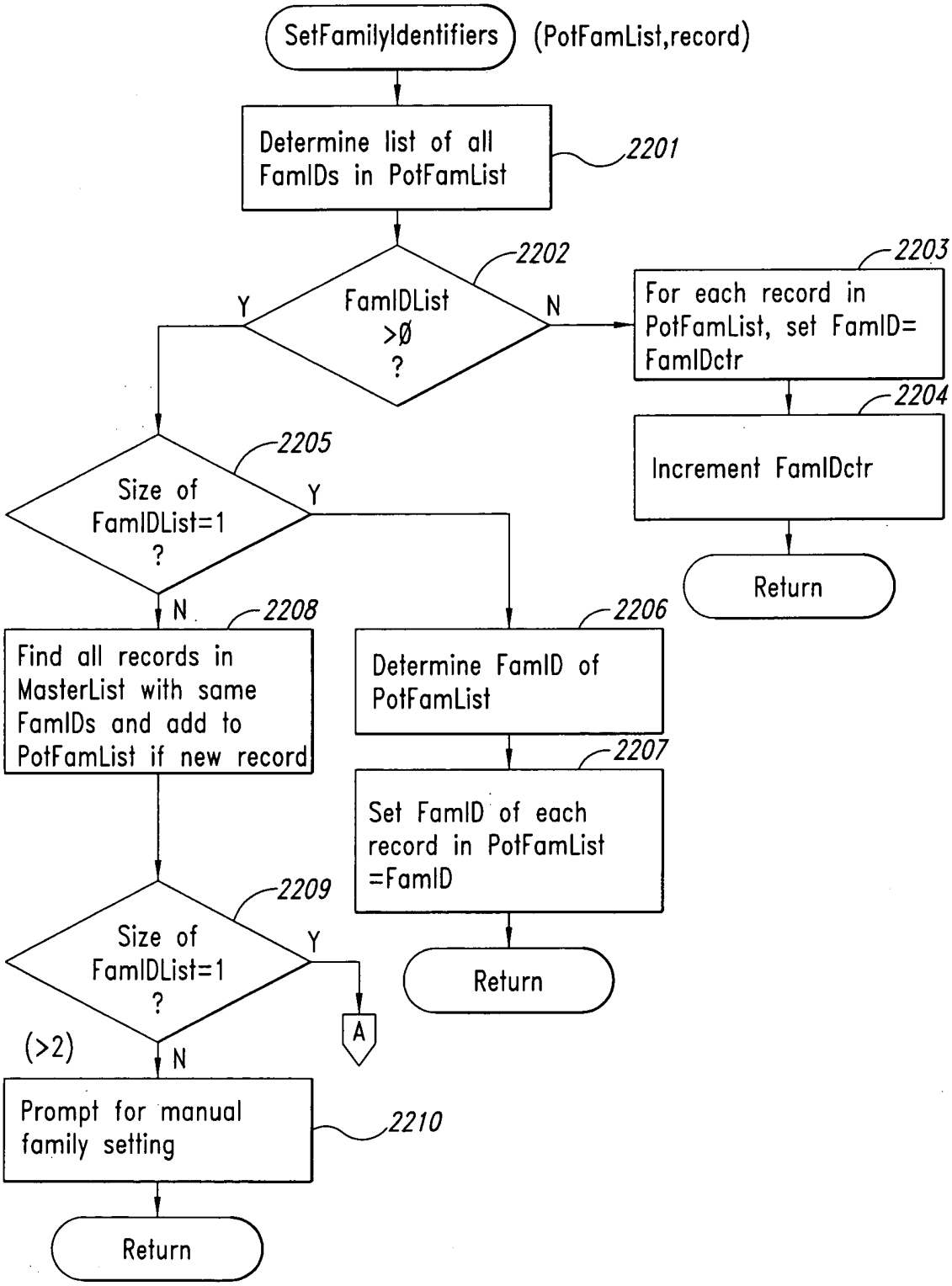
SetFamilyIdentifiers
(PotFamList,record)
Determine list of all FamIDs in PotFamList
2201
FamIDList >Ø ?
2202
Y
N
For each record in PotFamList, set FamID= FamIDctr
2203
Increment FamIDctr
2204
Return
Size of FamIDList=1 ?
2205
Y
N
Find all records in MasterList with same FamIDs and add to PotFamList if new record
2208
Determine FamID of PotFamList
2206
Set FamID of each record in PotFamList =FamID
2207
Return
Size of FamIDList=1 ?
2209
Y
(>2)
N
A
Prompt for manual family setting
2210
Return

Fig. 22A

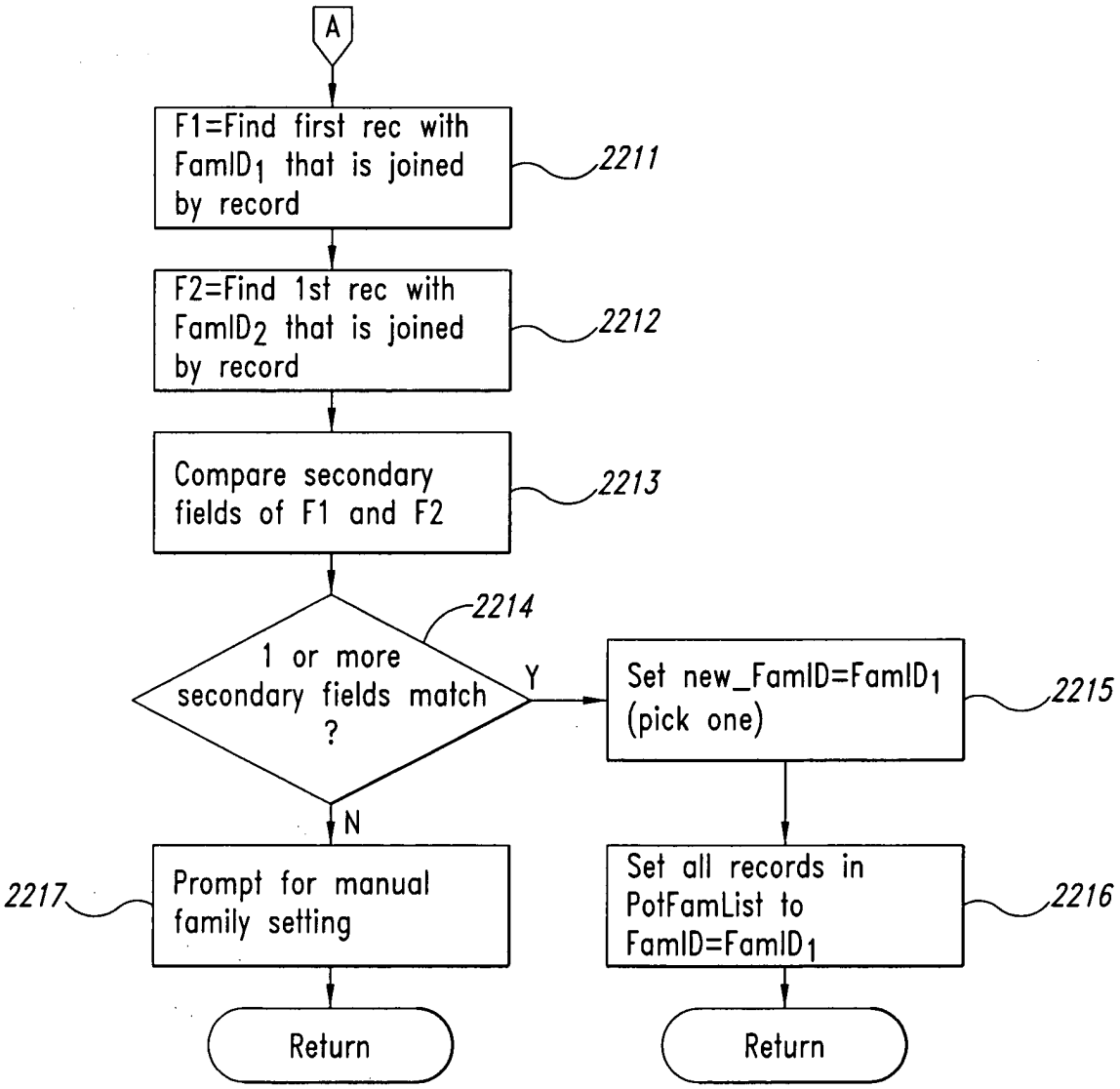
A
F1=Find first rec with FamID1 that is joined by record
2211
F2=Find 1st rec with FamID2 that is joined by record
2212
Compare secondary fields of F1 and F2
2213
2214
1 or more secondary fields match ?
Y
N
Set new_FamID=FamID1 (pick one)
2215
Set all records in PotFamList to FamID=FamID1
2216
Prompt for manual family setting
2217
Return
Return

Fig. 22B

Title: METHOD AND SYSTEM FOR IDENTIFICATION AND MAINTENANCE OF FAMILIES OF DATA RECORDS
Inventor(s): Kel[redacted]nig Express Mail No. EV064993065US Docket No. 480142.401

Table 9: Marriage (Coalescing Families)
Summary: Family 51 and Family 7 are joined by the new record.

2301

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	SIC Group	Alt Phone
1	Fuel Processors, WA	701 First Avenue	367-3319			51	Phone	29	
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51		29	
3	Fuel Processors, WA	222 15th Avenue NE	555-1212	2	9	51		29	
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51	NameState	29	Match
5	John's Oil-Refining, WA	222 15th Avenue NE	555-1212	2	9	51		29	
6	John's Oil-Refining, WA	1600 Oak Tree Road	614-9200			51		29	
9	Oil Re-Refining, WA	11750 33rd Place	367-3319				NEW RECORD	29	
7	John's Oil Pickup, WA	11750 33rd Place	417-6000		33	7		29	
8	John's Service, WA	11750 33rd Place	417-3251		33	7		29	Match

Fig. 23

Table 10: Unrelated Families

Summary: Family 7 is inappropriately marked by the new record. A Family is not assigned. 2401

#	NameState	Address	Phone	Common Phone	Common Location	Family	Source of Match	SIC Group	Alt Phone
1	Fuel Processors, WA	701 First Avenue	367-3319			51	Phone	29	
2	Fuel Processors, WA	12521 30th Street NW	526-6149	1		51		29	
3	Fuel Processors, WA	222 15th Avenue NE	555-1212	2	9	51		29	
4	Oil Re-Refining, WA	345 Center Street	526-6149	1		51	NameState	29	
5	John's Oil-Refining, WA	222 15th Avenue NE	555-1212	2	9	51		29	
6	John's Oil-Refining, WA	1600 Oak Tree Road	614-9200			51		29	
9	Oil Re-Refining, WA	1000 Main Street	367-3319				NEW RECORD	29	
7	Ace Hardware, WA	1000 Main Street	417-6000		33	7		30	
8	Ace Engineering, WA	1000 Main Street	262-8877		33	7		87	

Fig. 24